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# (54) Package for reconstituting a frozen pie or the like.

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**EP-A- 0 024 605**
**EP-A- 0 198 362**
**EP-A- 0 223 253**
**FR-A- 2 182 506**
**US-A- 4 190 757**
**US-A- 4 592 914**
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**US-A- 4 703 148**

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## Description

This invention relates to the art of preparing for consumption, or reconstituting, a frozen food entree, such as a frozen pot pie, and more particularly to a package in which the entree is reconstituted by application of microwave energy.

Prior art concepts for packaging a foodstuff to be cooked in a microwave oven are described in U.S. Patents Nos 4,230,924, 4,594,492, 4,626,641, 4,641,005 and 4,656,325.

The present invention is directed to a novel combination of an appliance, or package, with a frozen food that is topped by dough which, for consumption, is heated, baked and browned by microwave energy without undercooking of the interior food substance and deterioration of the crust into an unappealing, unappetizing heated mass of soggy dough. Heretofore this major problem has been unsolved so that pot pies and, indeed, fruit pies have not generally been available in a frozen condition and yet capable of being reconstituted in a microwave oven in a fashion to produce an appetizing end result. For that reason, pot pies and other frozen pies topped with a dough from quality producers have been packaged and sold in a metal pan which is to be placed into a conventional convection oven. This convection cooking requires a substantially long heating time to reconstitute the frozen pie into an acceptable food entree or dessert, and therefore manufacturers of quality pot pies and other crusted food items have been seeking an acceptable vehicle for manufacturing frozen pies, transporting them in an inexpensive carton for display at a retail outlet and then for reconstitution by microwave oven in a cooking time drastically less than the time required for baking the pie in a conventional convection oven. To achieve this pies have been prebaked so that the crust is browned, and then sold in a plastic container which can be heated in a microwave oven. This is nothing more than warming or reheating a previously cooked pie and does not solve the problem of an uncooked pie being baked and browned by a microwave oven. In addition, prebaking or partial baking of the pie tends to cause separation of the crust during shipment and/or reconstitution. Some pies are made with the crust somewhat rigid and spaced from the internal filler food. Others have placed substances on the crust to disguise the failure to bring the crust to the desired cooked condition.

The various patents mentioned above illustrate the extent to which major manufacturers are attempting to utilize microwave ovens for reconstituting foodstuffs of various types which involve browning and other localized heating.

US 4,230,924 employs the concept of converting energy at the wrapper to brown or crispen the the foodstuff. The amount of heating is controlled by increasing non-metallic gaps or stripes between metallic islands. There is no disclosure of a microwave impervious receptacle for housing the food to be heated and controlling cooking of a pot pie or similar food item.

A spring biased susceptor sheet is taught in US 4,594,492. The susceptor is forced against the upper surface of a food in a carton or container to be heated by microwaves. This patent also teaches the concept of partially shielding the foodstuff to limit the amount of microwave heating of material in the package itself.

US 4,626,641 combines the material of US 4,641,005 with a carton to hold a layer of this material a fixed distance above the crust of a pot pie. Again, spacing is indicated to be critical to produce radiant heating. No microwaves pass through the heating or crispening means of the patent to heat the inside of the pot pie as the crust is browned, and for that reason, the insert of patent No. 4,626,641 for holding the plastic pie container includes a lower opening to allow direct microwave heating of the pot pie filling.

US 4,641,005 utilizes susceptor material to construct the carton or container itself. It is not used as a separate and distinct susceptor sheet over the crust material as contemplated in the present invention.

US 4,656,325 is directed to a carton having a lower metal ground plane and an upper cover spaced a substantial distance above the foodstuff. This cover has a high dielectric constant and is produced by utilizing relatively large areas of metal material on the outside of the cover to increase the effective dielectric constant of the cover. A relatively large spacing above the foodstuff, in the range of 0.8 to 2.0 cm, is required for the heating system of this patent. This patent includes the concept of a metal foil container in combination with a non-reflecting energy cover having a special design. The cover must be relatively thick or include islands of metal paint or foil. This patent relates only to a more efficient manner of heating foodstuffs and is not directed toward the concept of browning an upper layer of dough.

The present invention provides an appliance to reconstitute pot pies, and other frozen food-stuffs, having an upper crust. In accordance with the invention, there is provided a frozen entree type foodstuff, such as a pot pie, formed from a precooked lossy filler food having a preselected depth and covered with a layer of uncooked dough with a preselected nominal thickness between an upper generally undulating surface and a lower surface, as well as a package for transporting and reconstituting this foodstuff in a microwave oven. The adjective "lossy" is used to designate a ma-

terial that is heated on exposure to microwave energy. The appliance or package of this combination includes, as a first component, a dish-shaped receptacle formed of microwave impervious foil material with a foodstuff cavity between a lower wall upon which the filler food is supported and an upper peripherally extending rim with a preselected shape and spaced from the lower wall a distance slightly greater than the preselected depth of the filler material and slightly less than the sum of the preselected depth and the preselected thickness of the dough so that the filler food is within the cavity and is shielded from direct microwave exposure, except through the dough itself. The undulating upper surface of the dough layer is above the rim at least at the rim area of the dish-shaped receptacle. By providing this microwave impervious foil material receptacle for the filler material, microwave energy does not enter the filler material except by penetrating and, thus, baking the dough material to form a crust. By shielding the filler material from microwave energy, only the energy passing through the dough actually heats the filler material of the pot pie. This uses the dough to modulate and reduce the heating effect of the microwave energy on the filler material as the dough is being baked by absorption of microwave energy. Another feature of the novel appliance used in combination with a frozen entree is a self-sustaining, generally rigid microwave susceptor sheet with an outer shape generally matching the preselected shape of the rim defining the outer periphery of the foil receptacle. "Generally matching" means it covers the dough and does not extend laterally a substantial distance. This susceptor sheet is supported on the dough in a generally heat conducting relationship with the upper undulating surface of the dough and is spaced from the rim of the receptacle by the thickness of the dough above the rim. This susceptor sheet is constructed of a thin metallized layer on a plastic film laminated to a relatively rigid paperboard with a thickness of the total susceptor sheet being less than 0.2 cm and with the metallized layer having a thickness allowing microwave heating of the thin metal layer to a sufficiently high temperature to brown the dough into a crust by conduction heating to a temperature generally exceeding about 90 °C.

In accordance with the invention, a method is provided for reconstituting a frozen pie formed from a precooked filler food having a preselected depth and covered with a layer of uncooked dough with a preselected nominal thickness between an upper undulating surface and a lower surface. This method comprises the steps of passing microwave energy, for a preselected time, through the dough layer and then into the filler material while shielding the filler material from other microwave energy for the preselected time during which the filler material or foodstuff is heated and the dough layer is baked, then covering the shielded material with a thin microwave heatable susceptor sheet and, then, passing microwave energy through the susceptor sheet for a time necessary to brown the upper surface of the dough while allowing microwave energy to pass through the dough layer into the otherwise shielded filler material.

In accordance with this method, it has been found that the time for preliminary heating and final heating with the susceptor sheet can be substantially the same. In practice, heating without the susceptor sheet is for approximately 5.5 minutes at 100% power. With the susceptor sheet applied, heating is continued for approximately 6.5 minutes at 50% power. The susceptor sheet, which is spaced from the surface of the dough but supported by the dough, may also be used for the total heating time which may be about 5.5 minutes at 100% power or 6.5 minutes at 50% power. In these examples, heating with the susceptor sheet in place can be increased by approximately 1.0 minutes as a maximum heating time.

By using the present invention, overcooking of the filler food material is prevented so that this material can be heated to the serving temperature as the crust has been baked and browned. This end result has proven extremely satisfactory for reconstituting chicken pot pies in a microwave oven in less than about 12 minutes.

## Brief description of the drawings

FIGURE 1 is a perspective view of the preferred embodiment of the present invention showing the two element appliance or utensil for microwave reconstitution of frozen pot pies;

FIGURE 1A is a perspective view of the self sustaining, generally rigid microwave susceptor sheet employed as one component of the appliance or utensil shown in FIGURE 1 with a cut away section exposing the lower plastic film;

FIGURE 2 is a partial, enlarged cross sectional view taken generally along line 2-2 of FIGURE 1;

FIGURE 2A is a partial view of the modification for a pot pie or a crusted food entree showing use of the preferred embodiment of the present invention;

FIGURE 3 is an enlarged partially cross sectioned view showing details of the susceptor sheet employed as one component of the appliance or utensil of the present invention;

FIGURE 4 is a plan view of a modified microwave susceptor sheet having tabs to space the susceptor sheet from the crust of the pot pie to be cooked with a cut away section showing the pot pie;

FIGURE 5 is an enlarged cross sectional view similar to FIGURES 2 and 2A illustrating the use of the modified susceptor sheet shown in FIGURE 4;

FIGURE 6 is a bottom plan view of a modification of the susceptor sheet shown in FIGURE 4;

FIGURE 7 is a further embodiment of a susceptor sheet which may be used in accordance with the present invention; and,

FIGURE 8 is an enlarged view of a susceptor sheet employed in accordance with the present invention with a modification to control or modulate the amount of microwave energy passing through the susceptor sheet during the cooking operation.

Referring now to the drawings, FIGURE 1 shows an appliance or utensil A formed from an aluminum tray or receptacle 10 and a microwave susceptor sheet 20 for the purposes of encapsulating a pot pie 30. As best shown in FIGURE 2, the aluminum tray or receptacle 10 is formed from aluminum foil and includes a normal food cavity 40 having generally divergent sidewalls 42 and an upper peripherally extending rim 50. Although postulated that this type of unit could not be employed for microwave heating, it has been found that such trays or receptacles can be placed in a microwave oven without damage to the oven or harmful arcing. In practice, the tray is preferably coated with a nonconductive plastic; however, this is not essential. Pot pie 30 in cavity 40 of receptacle 10 includes a filler food material 60 having an upper surface 62 which is spaced a distance a from the lower wall 44 of receptacle 10. It is observed that in FIGURE 2 the top or upper surface 62 of the filler material is below rim 50 so that microwave energy cannot pass into the filler material from the sides or the bottom. Tray or receptacle 10 is impervious to microwaves and is formed from a sufficient layer of aluminum to reflect the microwaves. Consequently, no heating takes place at the aluminum surfaces forming tray 10. In this fashion, the filler is shielded from microwave energy, except from energy entering through the top or open portion of cavity 40. This energy heats the filler material 60 and progresses to the lower dough layer 70, if such a layer is used to encapsulate the pie 30. Generally a frozen pot pie includes only an upper layer of dough 80. This layer has an upper undulating surface 82 and a lower generally flat surface 84. The latter surface is adjacent top surface 62 of filler material 60 to generally close any space or void at this area of the pie. The upper surface is indicated to be undulating. The lower surface may also be undulating, but is considered to be flat in that it interfaces with the upper or top surface 62 of filler material 60. Over the upper undulating surface 82 of dough layer 80 the rigid self sustaining generally flat microwave susceptor sheet 20 is placed to rest upon the dough by mere gravity during the cooking operation. Distance b is the distance from the lower wall 44 to the top of rim 50. This distance b is more than distance a for the shielding purposes previously described. Dough layer 80 has a thickness c which combines with depth a to define the overall height of the dough layer above lower wall 44. This combination is higher than the rim so that susceptor sheet 20 rests upon the crust and above the rim. All microwave energy passing into filler material 60 must pass through the dough. This is clearly illustrated in FIGURE 2. The susceptor sheet 20 allows a limited amount of microwave energy to pass, which energy is employed for the purposes of heating filler material 60 and baking upper dough layer 80. It will also bake dough layer 70; however, the invention envisages a system for cooking a pot pie as shown in FIGURE 2A, having no lower dough layer 70.

In accordance with the invention, a layer of metallized aluminum on the under surface of sheet 20 is heated by the microwave energy passing through the sheet to a temperature exceeding about 90°C. This causes heating of the upper surface of dough layer 80 by conduction from the lower surface of sheet 20. As the dough is baked by absorbed energy and rises or falls, the gravity held self-sustaining rigid susceptor sheet follows the dough so that the browning action is maintained even though the dough may change its size and/or position. Consequently, conductive heating which causes browning and a crisp texture to the upper surface 82 is maintained at an efficient position which is in contact with or supported on the crust formed by baking and browning of upper dough layer 80. To reduce the amount of browning while increasing the heating, there may be provided additional space between the susceptor sheet and the upper dough surface 82 by changing the pattern of the undulations.

FIGURE 2A relates to a preferred type of pot pie 30′ wherein the filler material 60′ has an upper surface 62′ covered by dough layer 80′ having an upper undulating surface 82′ and a lower surface 84′. Microwave susceptor sheet 20 having a shape generally matching the shape of the pie as shown in FIGURES 1 and 2, is rested upon surface 82′ which is heated by conduction from the metallized surface sheet 20.

Referring now to FIGURE 3, the preferred embodiment of the microwave susceptor sheet 20 is illustrated as including a paperboard sheet 100 having a thickness of about 0.05 cm and a thin plastic layer 102 of less than 0.0025 cm. Onto this layer is vacuum deposited a layer 104 of aluminum having a thickness e which is less than about 0.1 micron. Thickness d of sheet 20, as illustrated in

FIGURES 2 and 2A, is less than 0.2 cm and is preferably less than 0.1 cm. The preferred embodiment has a thickness d of about 0.05 cm. The vacuumized layer 104 is generally illustrated in the patents referred to above and normally has a thickness providing a surface resistivity in the approximate range of 0.15-45 ohms/cm$^2$. In accordance with another construction of this material, the spacing 106 between aluminum droplets 108 is controlled to allow passage of a preselected amount of microwave energy. In practice, this controlled percentage of microwave passage is in the general range of 50-80%. In accordance with the preferred embodiment of the present invention, surface 104 is controlled and tested for the surface resistivity to obtain the desired heating effect at surface 82.

Referring now to FIGURE 4, in some instances the susceptor sheet may be spaced a distance g from surface 82 of the layer of dough 80, as shown in FIGURE 5. In this instance, susceptor sheet 200 having an outer periphery matching the outer periphery of the pot pie 30, which is shown as oval, includes downwardly foldable tabs 210. These tabs are folded downwardly, as shown in FIGURE 5, so that the tabs can rest upon the floor 214 of the oven to leave a gap g of which the maximum height is directly related to the length of the tabs. In practice, this gap is quite small to still essentially cause conduction heating of surface 82 as previously explained. Often the tabs spread so sheet 200 is supported on rim 50 and layer 82. Spacing of more than about 0.8 cm produces radiant heating which is difficult to control and changes drastically as the crust changes shape. As previously explained, the susceptor sheet essentially rests upon upper layer 82. By providing gap g, additional microwave energy can enter between rim 50 and the lower surface of sheet 200. This causes additional cooking without distracting from the essentially conduction heating of surface 82. The layer 215 on the under surface of susceptor sheet 200 is provided with an aluminum surface having the characteristics previously described. Preferably, the surface resistivity is around 0.25 ohms/cm$^2$. The higher the resistance, the higher the temperature; therefore, when the susceptor sheet 200 is raised to produce the gap g, higher surface resistivity may be used. The gap g is in the range of 0.3-0.6 cm and less than 0.8 cm, as indicated in FIGURE 5. This is a relatively small spacing and essentially maintains a conductive relationship between the layer of metal on sheet 200 which becomes heated by microwave energy and causes the upper surface to be browned.

Referring now to FIGURE 6, susceptor sheet 220 includes fold down tabs 222 and 224 which have a width h generally matching the thickness c plus the gap g.

FIGURE 7 shows a tent-shaped susceptor sheet 230 with metallized inner surface 232 facing upper surface 82 of the pot pie 30 in receptacle or tray 10. This embodiment of the invention allows more microwave heating during the cooking operation. The height j from the apex of the tent-shaped configuration to the surface 82 is approximately 1.25 cm. This still maintains the browning effect on the upper surface so long as tray 10 shields the total pot pie from microwave heating, except by microwave energy which is first absorbed by the dough layer and then transmitted into the filler.

FIGURE 8 illustrates a modified susceptor sheet 20a wherein metallized layer 104 is provided with masked nonmetallized strips 106'. The width and number of these strips as compared to the total surface area of sheet 20a determines the amount of microwave energy allowed to pass freely through layer 104 for the purpose of increasing the amount of microwave heating through the dough and into the filler material. In this instance, the relationship between the area of strips 106' and surface 104 allows passage of 50-80% of the microwave energy. It is also contemplated that the amount of energy passing through sheet 20a could be controlled by masking through a photoresist process to produce the desired amount of area not covered by the layer 104.

## Examples

A chicken pot pie was reconstituted in a convection oven for 40-45 minutes at 205°C as a standard against which the invention was judged. The pot pie was cooked and the crust had a fully baked condition with a variation between a light brown and a dark brown. A duplicate of the standard pot pie was first heated in a conventional microwave oven for 5.5 minutes at 100% power without a susceptor sheet and thereafter a flat susceptor sheet as shown in FIGURE 1A was laid over the crust and the microwave oven was energized at 50% power for 6.5 minutes. The end result was a brown and reconstituted pot pie generally equivalent to the convection oven pot pie.

A further standard pot pie was provided with a raised susceptor sheet, as shown in FIGURE 6. This susceptor sheet was laid over the top surface 82 of the pot pie.

With the susceptor sheet in place, the microwave oven was operated at 100% power for 5.0 minutes. Thereafter, the microwave oven was operated for 6.5 minutes at 50% power with the raised susceptor sheet still in place. This pot pie was reconstituted in a fashion comparable in appearance and quality to the convention oven-heated pie.

To determine the maximum heating of these examples, the test was repeated using a flat susceptor which was laid on surface 82 and was subjected to microwave energy of an oven set to 50% power for 7.5 minutes. This process produced a browner and more crisp surface 82; however, it was still acceptable. The raised susceptor test was increased from 5.5 minutes at the 100% power level to 6.0 minutes at the 100% power level. This produced additional browning; however, it produced satisfactory results.

Another test was conducted with the tent-shaped susceptor sheet 230 as shown in FIGURE 7. This sheet had a spacing from the crust of about 1.25 cm at its apex and the pot pie of the type discussed above was heated for 8.0 minutes at 100% power level. The end result was successful and was somewhat advantageous in that a shorter heating cycle was required without changing the microwave setting.

In employing the present invention, the receptacle 10 is removed from the carton and heated in a microwave oven. Placing the susceptor sheet over the pot pie allows visual observation by the operator as well as some control by the operator as to the cooking procedure. Such control is generally a marketing advantage and, in this invention, results in a superior baking cycle for a food product having an upper crust.

## Claims

1. A combined frozen pie and a package for reconstituting the pie in a microwave oven, the pie including a precooked, lossy material filler food (60) being covered by a layer of uncooked dough (80) having an undulating upper surface (82) and a flat lower surface (84), the package comprising a dish-shaped receptacle (10) formed of microwave impermeable material having a lower wall (44) on which the dough is supported and an upper rim (50) spaced from the lower wall (44) a distance (b) greater than the depth (a) of the filler food (60) and less than the sum of the depth (a) of the filler food and the thickness (c) of the layer of uncooked dough (80) and a separate microwave susceptor sheet (20), less than 0.2 cm thick and being formed by a metallised layer (104) subdivided into droplets separated by a spacing (106) between them to allow passage of a preselected amount of microwave energy, on a plastic film (102) laminated to a paper board (100), the combination of the frozen pie and the package being characterized in that the sheet (20) generally matches the shape of the pie and is supported directly on the undulating upper surface (82) of the dough layer (80) and spaced from the rim (50) whereby the microwave energy to heat the lossy filler food (60) enters the receptacle (10) only through the sheet (20) which, being heated by the microwave energy, browns the undulating upper surface (82) of the uncooked dough layer (80).

2. A combined package and frozen pie according to claim 1 in which the metallised layer (104) has a surface resistibility of 0.15 to 0.45 ohms/cm$^2$.

3. A combined package and frozen pie according to any preceding claim in which the metallised layer (104) has a thickness of less than 0.1 µm.

4. A combined package and frozen pie according to any preceding claim in which the metallised layer (104) permits passage of 50-80% of the applied microwave energy.

## Patentansprüche

1. Kombination eines tiefgekühlten Kuchens und einer Verpackung zum Rekonstituieren des Kuchens in einem Mikrowellenherd, wobei der Kuchen eine vorgekochte mikrowellenabsorbierende Nahrungsmittelfülle (60) aufweist, die von einer Lage aus ungekochtem Teig (80) bedeckt ist, welche eine gewellte Oberseite (82) und eine flache Unterseite (84) aufweist, wobei die Verpackung einen schüsselförmigen Behälter (10) umfaßt, der aus einem mikrowellenundurchlässigen Material gebildet ist und eine untere Wand (44), auf welcher der Teig abgestützt ist, sowie einen oberen Rand (50) aufweist, welcher von der unteren Wand (44) einen Abstand (b) hat, der größer als die Tiefe (a) der Nahrungsmittelfülle (60) und kleiner als die Summe der Tiefe (a) der Nahrungsmittelfülle und der Dicke (c) der Lage aus ungekochtem Teig (80) ist, und ein getrenntes Mikrowellen-Suszeptorblatt (20), das weniger als 0,2 cm dick und durch eine metallisierte Schicht (104) gebildet ist, welche in Tröpfchen unterteilt ist, die voneinander einen Abstand (106) haben, um den Durchgang einer vorgewählten Menge von Mikrowellenenergie zu ermöglichen, auf einem Kunststoffilm (102), welcher auf einen Karton (100) laminiert ist, wobei die Kombination aus tiefgekühltem Kuchen und Verpackung dadurch gekennzeichnet ist, daß das Blatt (20) allgemein an die Form des Kuchens angepaßt und direkt auf der gewellten Oberseite (82) der Teiglage (80) abgestützt sowie vom Rand (50) beabstandet ist, wodurch die Mikrowellenenergie zum Erhitzen der mi-

krowellenabsorbierenden Nahrungsmittelfülle (60) in den Behälter (10) nur durch das Blatt (20) eintritt, welches durch die Mikrowellenenergie erhitzt die gewellte Oberseite (82) der ungekochten Teiglage (80) bräunt.

2. Kombination eines tiefgekühlten Kuchens und einer Verpackung nach Abspruch 1, bei welcher die metallisierte Schicht (104) einen spezifischen Oberflächenwiderstand von 0,15 bis 0,45 Ohm/cm$^2$ aufweist.

3. Kombination eines tiefgekühlten Kuchens und einer Verpackung nach Abspruch 1 oder 2, bei welcher die metallisierte Schicht (104) eine Dicke von weniger als 0,1 µm aufweist.

4. Kombination eines tiefgekühlten Kuchens und einer Verpackung nach einem der vorhergehenden Ansprüche, bei welcher die metallisierte Schicht (104) den Durchgang von 50 bis 80 % der angewendeten Mikrowellenenergie zuläßt.

**Revendications**

1. Tourte congelée et emballage combinés pour reconstituer la tourte dans un four à micro-ondes, la tourte comprenant une garniture alimentaire précuite (60) en matière dissipative recouverte d'une couche de pâte non cuite (80) ayant une surface supérieure ondulée (82) et une surface inférieure plate (84), l'emballage comportant un réceptacle (10) en forme de plat formé d'une matière imperméable aux micro-ondes ayant une paroi inférieure (44) sur laquelle la pâte est supportée et un rebord supérieur (50) espacé de la paroi inférieure (44) d'une distance (b) supérieure à la profondeur (a) de la garniture alimentaire (60) et inférieure à la somme de la profondeur (a) de la garniture alimentaire et de l'épaisseur (c) de la couche de pâte non cuite (80), et un suscepteur en feuille séparé (20) pour micro-ondes, d'une épaisseur inférieure à 0,2 cm et formé d'une couche métallique (104) subdivisée en gouttelettes séparées les unes des autres par un écartement (106) pour permettre le passage d'une quantité préalablement choisie d'énergie de microondes, sur un film (102) de matière plastique stratifié sur une feuille de carton (100), la combinaison de la tourte congelée et de l'emballage étant caractérisée en ce que la feuille (20) est globalement adaptée à la forme de la tourte et est supportée directement sur la surface supérieure ondulée (82) de la couche de pâte (80) et est espacée du rebord (50) de manière que l'énergie des micro-ondes pour chauffer la garniture alimentaire dissipative (60) entre dans le réceptacle (10) uniquement à travers la feuille (20) qui, en étant chauffée par l'énergie des micro-ondes, brunit la surface supérieure ondulée (82) de la couche de pâte non cuite (80).

2. Emballage et tourte congelée combinés selon la revendication 1, dans lesquels la couche métallisée (104) présente une résistivité superficielle de 0,15 à 0,45 ohm/cm$^2$.

3. Emballage et tourte congelée combinés selon l'une des revendications précédentes, dans lesquels la couche métallisée (104) présente une épaisseur inférieure à 0,1 µm.

4. Emballage et tourte congelée combinés selon l'une quelconque des revendications précédentes, dans lesquels la couche métallisée (104) permet le passage de 50 à 80 % de l'énergie de micro-ondes appliquée.

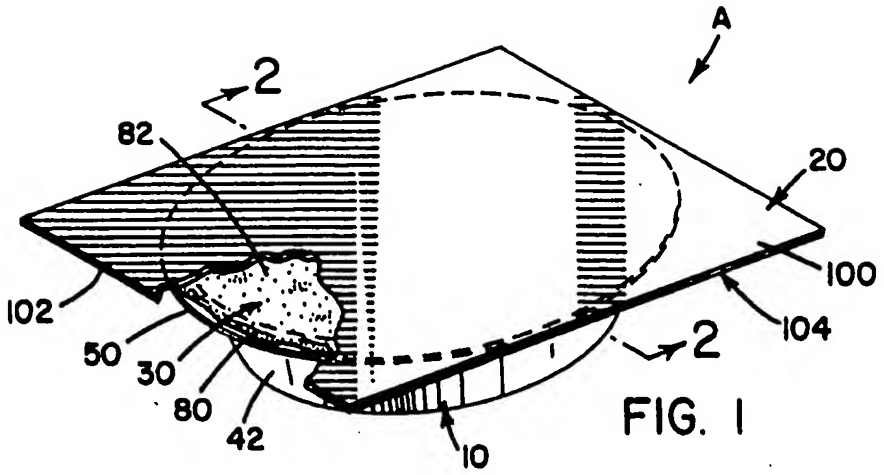
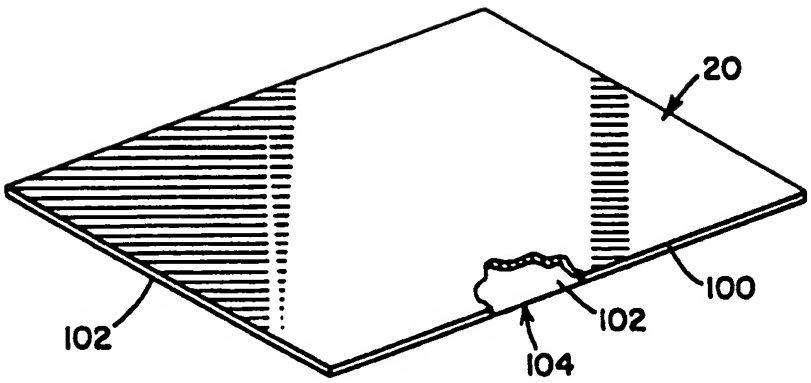



FIG. 1

FIG. 1A



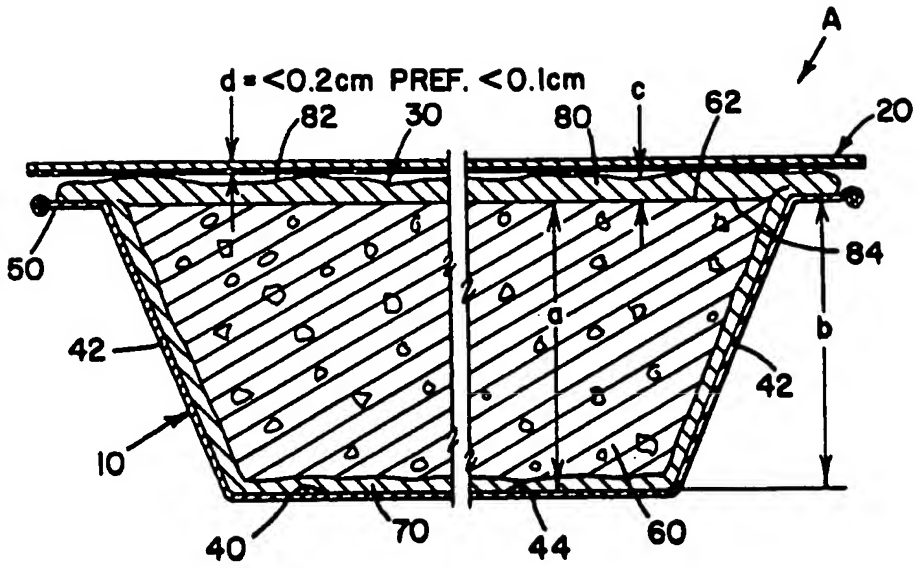



FIG. 2

FIG. 2A
(PREFERRED)

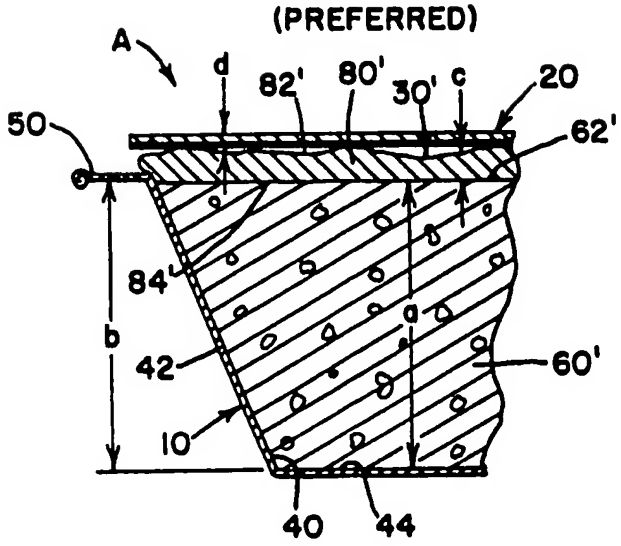
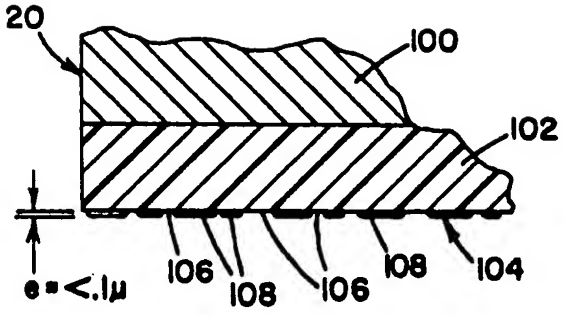


FIG. 3


20
100
102
e = <.1μ
106
108
106
108
104

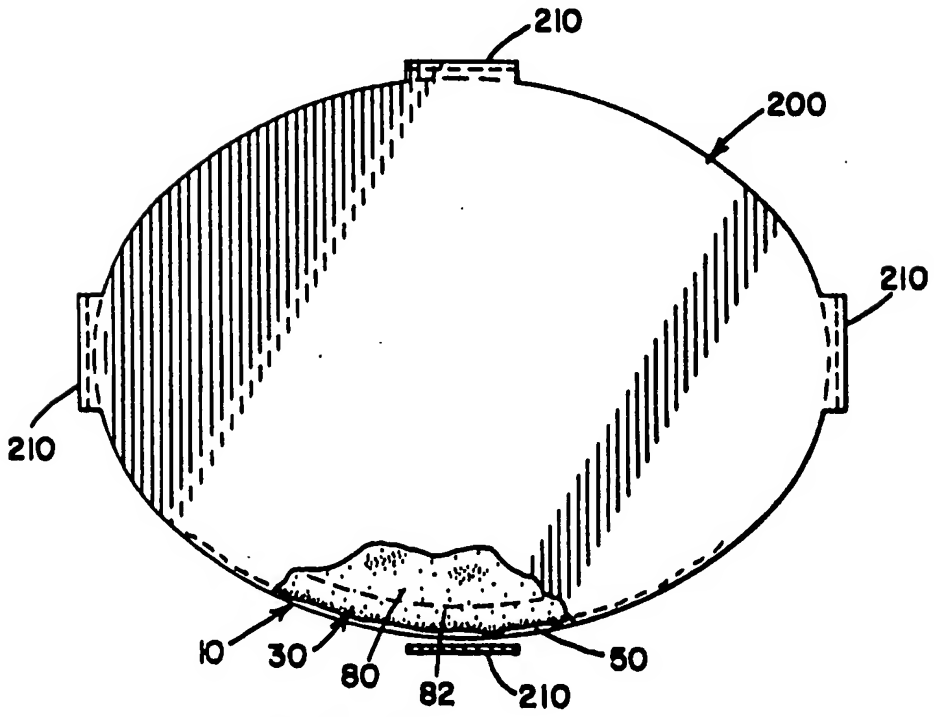

210
200
210
210
10
30
80
82
210
50

FIG. 4

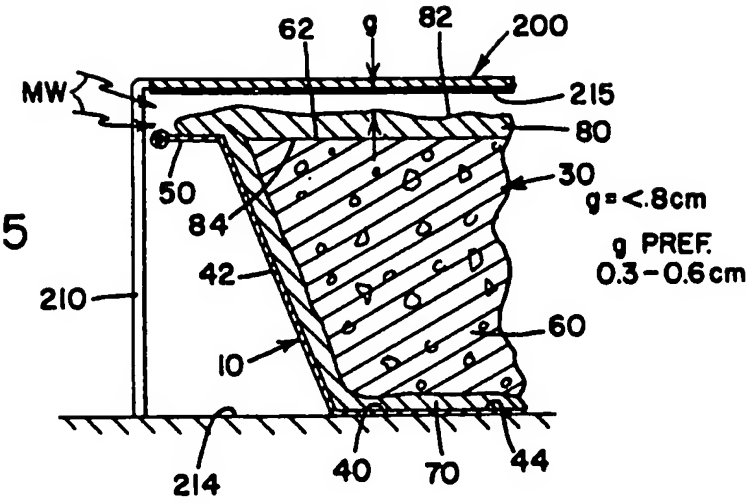

62
g
82
200
MW
215
80
50
30
g = <.8cm
84
g PREF.
0.3 - 0.6cm
42
210
60
10
214
40
70
44

FIG. 5

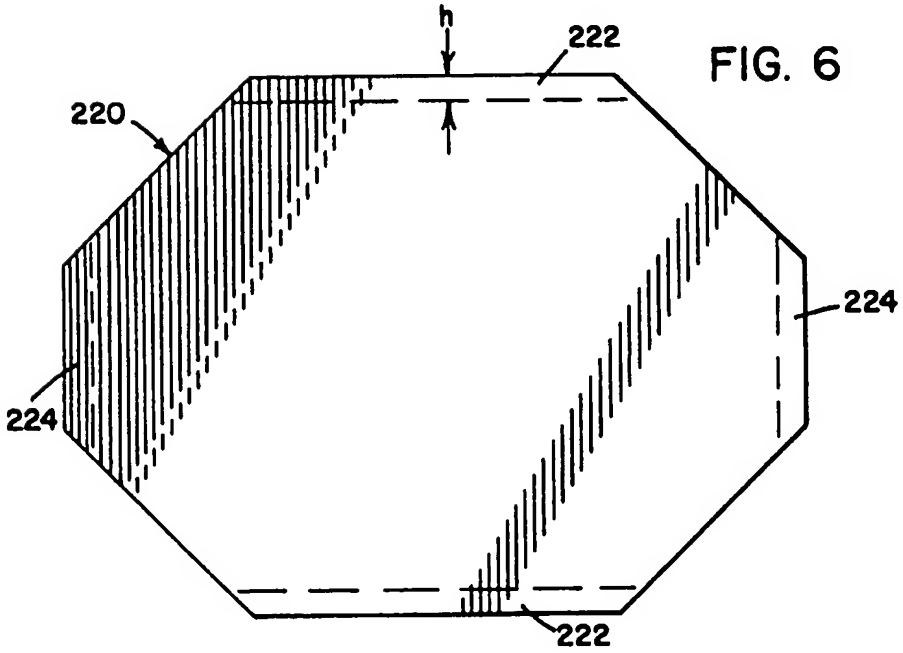

h
222
220
224
224
222

FIG. 6

FIG. 7

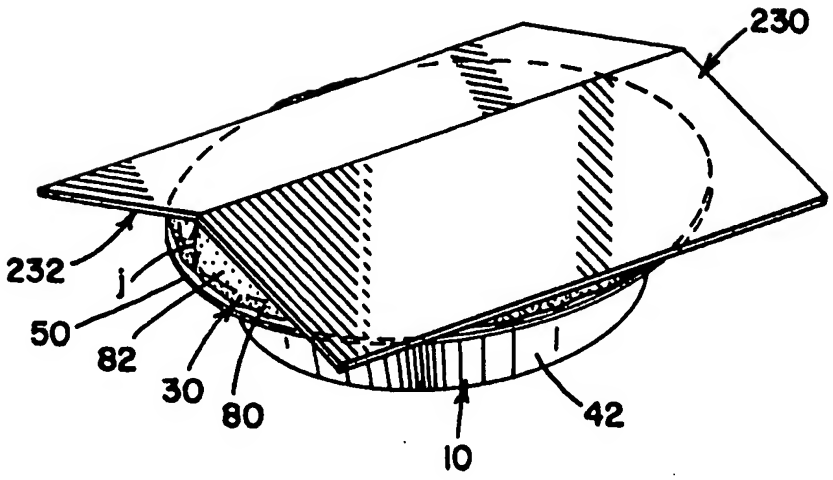



FIG. 8